

CRIEHAVEN HARBOR AND MATINICUS HARBOR MAINE

SURVEY (REVIEW OF REPORTS)



**CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.**

JUNE 22, 1956

23

NOT FOR PUBLIC RELEASE

SURVEY (REVIEW OF REPORTS)

OF

CRIEHAVEN HARBOR AND MATINICUS HARBOR, MAINE

SYLLABUS

The Division Engineer finds that although the desired improvements would increase the protected anchorage areas, reduce storm and wave damage, permit expansion of the lobster fleet and provide harbors of refuge, the cost of providing the necessary breakwaters outweighs the prospective benefits. He recommends that no modification be made at this time of the existing projects for Criehaven Harbor, or Matinicus Harbor, Maine.

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CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION
150 CAUSEWAY STREET
BOSTON 14, MASS.

22 June 1956

SUBJECT: Survey (Review of Reports) of Criehaven Harbor and Matinicus Harbor, Maine.

TO: Chief of Engineers, Department of the Army, Washington 25, D.C.

AUTHORITY

1. This report is submitted in compliance with the following resolutions adopted by the Committee on Public Works of the House of Representatives, United States Congress:

Criehaven Harbor

Resolution adopted May 27, 1947

"RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE HOUSE OF REPRESENTATIVES, UNITED STATES, That the Board of Engineers for Rivers and Harbors be, and is hereby, requested to review the reports on Crie Haven Harbor, Maine, published in House Document Numbered 310, Seventy-second Congress, First Session, with a view to determining if it is advisable to modify the existing project in any way at this time, particularly with a view to extending the breakwater."

Matinicus Harbor

Resolution adopted April 13, 1948

"RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE HOUSE OF REPRESENTATIVES, UNITED STATES, That the Board of Engineers for Rivers and Harbors be, and is hereby, requested to review the reports on the breakwater at Indian Ledge, Matinicus, Maine, published in House Document Numbered 653, Sixtieth Congress, First Session, with a view to determining the advisability of extending the existing breakwater 350 feet."

SCOPE OF SURVEY

2. A review report of survey scope was authorized by the Chief of Engineers for Crie Haven Harbor on June 16, 1947, and for Matinicus Harbor

on May 3, 1948. In the preparation of this report, a detailed hydrographic survey of the area of the desired improvements was made from which estimates of quantity were prepared. Available maps and other data pertaining to the area have been studied. A public hearing was held at Criehaven on September 30, 1947 and at Matinicus on July 20, 1948. The information provided at the hearings and in later correspondence is included in this report under Improvement Desired.

DESCRIPTION

3. General. - Criehaven Harbor is located on the northwesterly side of Ragged Island, and Matinicus Harbor on the east side of Matinicus Island. These two small islands are part of a group of islands in the Atlantic Ocean, about 17 miles southerly of the mouth of Penobscot Bay, Maine. Matinicus Harbor is two miles northerly of Criehaven Harbor, measured in a straight line, but four miles by the course a boat would have to travel. The nearest mainland port is Rockland Harbor, 20 miles to the northwest. The islands lie directly in the path of coastwise traffic bound to northern Maine and New Brunswick, and in productive lobster grounds. These harbors are further offshore than any other on the northern New England coast. The locality is shown on United States Coast and Geodetic Survey Charts Nos. 322 and 1203, and on the maps accompanying this report.

4. Criehaven Harbor. - Criehaven Harbor is entered between the end of the existing breakwater and Harbor Point. The entrance is about 475 feet wide at the high water line and about 350 feet wide at the mean low water line. The harbor is about 1,000 feet long by an average width of about 400 feet. The depth, at mean low water, varies from 22 feet at the entrance to about 7 feet near the head of the harbor. The mean tidal range is 9.1 feet and the spring range is 10.4 feet. The harbor offers protection from all storms except those from the northwest quadrant.

5. Matinicus Harbor. - Matinicus Harbor is a natural harbor, approximately 600 feet wide and 1,500 feet long, with a mean tidal range of 9.1 feet, and a spring range of 10.4 feet. It offers a sheltered offshore harbor for small craft with drafts of from 4 to 7 feet. The harbor is reasonably safe from northerly, westerly, and southerly storms but imperfectly so from southeasterly or easterly storms.

TRIBUTARY AREA

6. Criehaven Harbor. - Ragged Island, which contains about 300 acres, is located in Knox County. It was settled in 1849 by Robert Crie. The village and Post Office are called Criehaven. It was a part of Matinicus Isle Plantation until 1897 when it was set off from Matinicus and organized as a plantation. Its organization was given up in 1925

An aerial photograph of Matinicus Harbor, showing the harbor water, surrounding islands, and a breakwater. The image is high-contrast and grainy. Labels are overlaid on the image to identify key features.

MATINICUS

ISLAND

FEDERAL
BREAKWATER

INDIAN
LEDGE

MATINICUS
HARBOR

WHEATON

ISLAND

and Criehaven became unorganized territory, the jurisdiction of which reverted to the State of Maine. In 1930, the latest available census in which it is listed separately, Criehaven had a population of 67. In the 1950 U. S. Census, Criehaven was included with other islands of Knox County not belonging to any town, with a total permanent population of 18. It has been ascertained that 25 families lived on the island during the summer of 1950. Local interests stated that Ragged Island real estate had a valuation of \$161,000 in 1947. The principal industry of the community is lobstering, with the investment in the industry being stated as \$110,000 for boats and gear in 1947. There are about 20 lobster boats based at Criehaven Harbor.

7. Matinicus Harbor. - Matinicus Isle Plantation includes the 800 acre Matinicus Island and five very small adjacent islands. In 1955 the Island had a population of about 180, and a real estate value of about \$55,000. The community's principal source of income is derived from lobstering, in which occupation there are 50 boats engaged, having a value, including equipment, of approximately \$200,000. There are several summer homes on Matinicus Island.

8. General. - For communication with the mainland, the communities depend principally on a diesel powered 60-foot vessel which runs from Rockland to Criehaven, via Matinicus. This boat, carrying mail, passengers and general freight, makes three round trips per week during the spring, summer and fall period, April 1 to November 1, and two trips per week during the winter period from November 1 to April 1. Lobster carriers having a cargo capacity of about 20,000 pounds also operate between the islands and the mainland ports of Port Clyde, Tenants Harbor and Rockland. The communities depend on oil for heat, light and cooking, and on gasoline for the chief motor fuel for the lobster fishing fleet. Small coastal tankers deliver oil and gasoline from Rockland. The nearest railroad line is at Rockland, Maine. Charter plane service is also available from Rockland. Telephone connection with the mainland is available over a Coast Guard communication line.

BRIDGES

9. There are no bridges crossing the waterways within the area considered in this report.

PRIOR REPORTS

10. Criehaven Harbor. - Federal interest in the improvement and development of Criehaven Harbor extends back to 1912, at which time a study of the locality was authorized. The following is a list of prior reports submitted on the harbor.

Published In	Nature of Report	Work Considered
House Document No. 1454, 63rd Congress, 3rd Session - 1914	Unfavorable	Stone breakwater 325 feet long at Sunset Point.
House Document No. 310, 72nd Congress, 1st Session - 1932	Favorable	Stone breakwater 300 feet long at Sunset Point. Recommended.

11. Matinicus Harbor. - Interest in the improvement of Matinicus Harbor was first indicated by the Federal Government in 1875, when an act of Congress appropriated money for a survey and study for development of the harbor. The following list comprises the reports on Matinicus Harbor.

Published In	Nature of Report	Work Considered
House Document No. 71, 44th Congress, 1st Session - 1876	Favorable	Construction of breakwaters for development of a harbor. Recommended.
Annual Report, Chief of Engineers for 1887 - Preliminary Examination:	Unfavorable	Development of a harbor of refuge in Matinicus Roads between Matinicus Island and Ragged Island. Not Recommended.
House Document No. 653, 60th Congress, 1st Session - 1908	Favorable	Construction of a stone breakwater 450 feet long from Youngs Point to Indian Ledge. Recommended.

EXISTING CORPS OF ENGINEERS' PROJECT

12. Criehaven Harbor. - The existing project, completed in 1935, was authorized May 28, 1935, under the Emergency Relief Appropriation Act of 1935 and by the River and Harbor Act, approved August 30, 1935, and consists of riprap stone breakwater extending 300 feet from Sunset Point in a northerly direction with a top width of 10 feet, a top elevation of 15 feet above mean low water and side slopes of 1 on 1.5 on the seaward side and 1 on 1 on the harbor side. Total expenditures to

date on the project amount to \$40,775.99 for new work and \$7,956.28 for maintenance. An inspection made in 1954 indicated that the breakwater although slightly damaged was not in immediate need of repair.

13. Matinicus Harbor. - The existing Federal project was authorized by River and Harbor Act of June 25, 1910, which appropriated \$13,000 for the improvement of Matinicus Harbor. The improvement consists of a stone breakwater extending from Youngs Point to Indian Ledge, having a top width of 10 feet, at an elevation 15 feet above mean low water, with side slopes of 1 on 1.5. The project was completed September 23, 1911 at a cost of \$14,000. Total expenditures to date have been \$22,434.54, including \$8,413.11 for maintenance. A condition survey made in 1952 showed that the breakwater was in serviceable condition.

LOCAL COOPERATION ON EXISTING AND PRIOR PROJECTS

14. The River and Harbor Act of August 30, 1935, required local interests to provide, without cost to the United States, the necessary rights-of-way for construction of the shore end of the breakwater at Criehaven Harbor. An instrument conveying the necessary rights-of-way was accepted as a satisfactory compliance by the Chief of Engineers, on August 14, 1935. Local cooperation was not required on the existing project for Matinicus Harbor.

OTHER IMPROVEMENTS

15. There have been no improvements for navigation at Criehaven Harbor or Matinicus Harbor other than the existing Federal projects.

TERMINAL AND TRANSFER FACILITIES

16. Criehaven Harbor. - There are 6 wharves in the harbor, one of which is in very poor condition. Some are of timber and pile, and some of stone and crib construction. Two of the wharves have been constructed since 1947. The wharves serve the boats of the local lobstermen, lobster dealer, and mail and fuel boats. There is no public wharf and all commercial freight, mail, and passengers are landed at the lobster dealer's wharf, which is the largest in the harbor.

17. Matinicus Harbor. - There are 12 privately-owned wharves in the harbor, variously constructed of wood piles, stone, and crib work, and all are in fairly good condition. There is no publicly-owned wharf, but one private wharf is available for landing of mail, freight and passengers. The berths at these wharves are dry at low water. One wharf has facilities for boat repair work, being equipped with machinery for removing engines and general repairs.

IMPROVEMENT DESIRED

18. Criehaven Harbor. - At a public hearing held at Criehaven on September 30, 1947, it was indicated that the improvement desired by local interests is the extension of the existing breakwater for a distance of 150 feet in a northerly direction. The hearing was attended by representatives of the local lobster industry. Local interests indicated that the proposed improvement would reduce damage to boats anchored within the harbor during west and northwest storms, and provide additional safe anchorage so that additional boats will be based at the harbor. The improvement would make the harbor a place of refuge for fishermen using the adjacent fishing grounds which surround the island and allow a greater development of the lobster industry now located there. Under present conditions, docking is subject to storm conditions, and the breakwater extension would allow the mail, freight, passenger and fuel boats to dock at the island regularly. A fish dealer felt that improvement of the harbor would allow the establishment of a fresh fish industry on the island. Fishing at present is limited to the procurement of lobster bait. The principal proponent advocating the fresh fish industry has since removed from the island.

19. Matinicus Harbor. - A public hearing was held at Matinicus, July 20, 1948, to determine the modification or improvements desired by local interests. The hearing was attended by local lobstermen and summer visitors. The hearing developed that the improvement desired is the construction of a new stone breakwater, extending 350 feet northerly from the north side of Wheaton Island. It was the unanimous opinion of local interests that the desired improvement would greatly benefit the harbor by providing additional protection from severe easterly and southeasterly storms. Navigation in the harbor is impossible during these storms, with the result that the maintenance of regular schedules by boats carrying commodities to the island is not possible, and in emergencies the Coast Guard is hindered in furnishing transportation to the island for medical aid. It was claimed by local interests that the provision of additional protection to the anchorage on the southerly side of the harbor would result in an expansion of the lobster fishing industry, thus enabling returning servicemen to enter this industry. At present, it is not practicable for additional men to enter the lobster industry, due to the extent of utilization of the existing anchorage. The improved anchorage would also serve as a harbor of refuge for fishing and pleasure craft which are now forced to make a hazardous 20 mile run to Rockland in the event of sudden storms. Summer visitors also claimed that more pleasure craft would frequent the harbor if safe protection from storms could be effected. Storms have caused considerable damage to boats, lobster cars, and waterfront installations, with their owners suffering a heavy monetary loss. It was claimed that the desired improvement would eliminate this loss.

COMMERCE

20. Criehaven Harbor. - There is no systematic collection of commercial statistics for Criehaven Harbor. Local interests reported that the annual catch of lobsters is in excess of 200 tons. If the harbor conditions are improved, local fishermen as well as the lobster dealers anticipate as much as a 50 percent increase in the annual catch of lobsters.

21. Matinicus Harbor. - The compilation of complete statistical records of commerce in Matinicus Harbor was discontinued a number of years ago. Records that are available for 1948 indicate that 285 tons of gasoline, fuel oil and kerosene, and 249 tons of miscellaneous merchandise were received at the island and 10 tons of miscellaneous merchandise were shipped out. Information obtained at the public hearing in 1948, relative to the yearly lobster catch, placed the size of the catch at between 200 and 300 tons.

22. General. - The commerce of the islands is carried on principally with the mainland port of Rockland, which serves most of the islands in Penobscot Bay. Rockland is the shopping center for most of the island trade since supplies can be obtained by mail boat 2 or 3 times a week, depending on the season. This general commerce to the islands consists of commodities necessary for the operation of the local fleets and for the subsistence of the population.

VESSEL TRAFFIC

23. Criehaven Harbor. - There are 20 boats at Criehaven which are regularly engaged in lobstering. They range from 30 to 36 feet in length and have drafts of 2.5 to 4 feet. Approximately 10 other larger boats intermittently call at the harbor, these boats varying from 50 to 72 feet in length with drafts of 6 to 8 feet. In addition, a few pleasure craft visit the harbor, but do not stay any length of time due to lack of safe anchorage. The desired improvement would provide safe anchorage for additional boats.

24. Matinicus Harbor. - There are 50 boats based in the harbor, ranging in length from 20 to 40 feet with drafts of 2.5 to 4 feet. An additional number of boats regularly visit the harbor to bring in freight, mail and passengers, the larger of these boats having lengths of 50 to 72 feet with drafts of 6 to 8 feet. Irregular trips, averaging 9 to 12 monthly, are also made by lobster buyers' boats which are 60 to 75 feet in length with a 5 to 7-foot draft. In addition to the above vessels, visiting pleasure craft call at the harbor during the summer months.

DIFFICULTIES ATTENDING NAVIGATION

25. Criehaven Harbor. - The entrance to Criehaven Harbor is partially exposed to northerly and westerly winds and fully exposed to northwesterly winds. Winds blow from the north, northwest and west about 40 percent of the time, and equally from the south, southwest and west. Local interests have stated that after a southeast storm has been blowing for about twelve hours, heavy southeasterly seas develop. With a sudden shift of the wind through south, southwest, west and finally to northwest, the seas are acted upon by the shifting winds which sweep them around the end of the existing breakwater and create excessive surge or undertow within the harbor. This condition is stated to make mooring difficult since the waves may be progressing in a direction different from the direction in which the wind is blowing. The surge or undertow prevails in the harbor for days after such a storm and prevents commercial boats from docking at the wharf to load or discharge cargo and passengers. During the extremely hazardous conditions created by storm winds from the exposed quarter, boats can neither leave nor enter the harbor, nor can they be docked within the harbor. During these periods, the local fleet remains at anchor in the harbor using established heavy moorings.

26. Matinicus Harbor. - Matinicus Harbor is exposed to easterly and southeasterly storms which drive heavy seas off the north point of Wheaton Island, directly into the harbor. The configuration of the harbor and location of the existing breakwater is such that only limited protection from such storms is afforded and considerable damage to boats, wharves, buildings and equipment is incurred. These storms occur spasmodically, varying in intervals from two or three in a year, to three in one month. During these storms, it is impossible for boats to enter or leave. Trips into Matinicus are cancelled rather than risk the dangers involved in navigating the harbor. The mouth of the harbor is approximately 600 feet wide, bordered by Indian Ledge on the north side and Wheaton Island on the south. This entrance is reduced to approximately 450 feet at low tide. With heavy seas rolling off the end of Wheaton Island, boats attempting to negotiate the entrance are driven toward Indian Ledge.

WATER POWER AND OTHER SPECIAL SUBJECTS

27. The waterways are tidal. Matters of water power or flood control are not pertinent to this report. The proposed improvement would have no adverse effect on shellfish or wildlife.

PLAN OF IMPROVEMENT

28. Criehaven Harbor. - The plan of improvement for Criehaven Harbor considered herein is the extension in a northerly direction of the riprap breakwater, as desired by local interests. Estimates are

based upon results of a hydrographic and topographic survey made in September 1948. The desired extension is 150 feet long and of the same type of construction and cross-section as the existing structure. Perhaps a greater degree of shelter in the harbor could be obtained by extending the breakwater toward Harbor Point or from Harbor Point toward the tip of the existing breakwater. However, the entrance, which is now about 300 feet wide at low tide and would be reduced to 250 feet by such a breakwater, would then be so narrow that it would be hazardous to navigate even during moderate storms.

29. Matinicus Harbor. - The desired improvement consists of the construction of a stone breakwater, extending 350 feet in a northerly direction from the north end of Wheaton Island, having a top width of 10 feet at an elevation of 15 feet above mean low water and side slopes of 1 on 1.5. A 300 foot long breakwater at the same location would provide about the same degree of protection but would be much less expensive because excessive depths of water would be encountered in the additional 50-foot reach. Both of these improvements have been considered in this report.

AIDS TO NAVIGATION

30. The United States Coast Guard has been consulted on aids to navigation and has advised that it would be necessary to relocate the light on the existing breakwater at Criehaven Harbor to the outer end of the desired extension. This change is estimated to cost \$10,000, with no additional maintenance cost. The Coast Guard has advised that no additional aids to navigation would be required for Matinicus Harbor.

SHORE LINE CHANGES

31. The shore line in the vicinity of both harbors is generally exposed ledge. The desired improvements would not have any effect upon these adjacent shores.

ESTIMATES OF FIRST COST

32. Estimates of first cost have been prepared for the desired improvement at Criehaven and for the desired improvement and a lesser improvement at Matinicus. The unit cost of stone for the breakwater was estimated at \$12.00 per ton based on prices prevailing in May 1956. The estimates of first cost are as follows:

	<u>CRIEHAVEN</u>	<u>MATINICUS</u>	
Breakwater length (feet)	<u>150</u>	<u>350</u>	<u>300</u>
Tons of rock required	18,000	40,000	30,000
PROJECT CONSTRUCTION COSTS			
Breakwater at \$12/ton	\$215,000	\$480,000	\$360,000
Contingencies	30,000	70,000	50,000
Engineering and Design	5,000	10,000	7,000
Supervision and Administration	<u>20,000</u>	<u>40,000</u>	<u>33,000</u>
Total	\$270,000	\$600,000	\$450,000
Other Construction			
Aids to navigation	10,000	0	0
TOTAL PROJECT COST	\$280,000	\$600,000	\$450,000

ESTIMATES OF ANNUAL CHARGES

33. The estimated annual carrying charges have been computed on an assumed project life of 50 years, and at an interest rate of 2.5 percent. Estimates of annual costs of additional future maintenance are based on experience with the existing structure in each harbor. The estimated annual charges are shown below:

	<u>CRIEHAVEN</u>	<u>MATINICUS</u>	
Breakwater length (feet)	<u>150</u>	<u>350</u>	<u>300</u>
Construction Cost	\$270,000	\$600,000	\$450,000
Aids to navigation	<u>10,000</u>	<u>0</u>	<u>0</u>
Total Investment	\$280,000	\$600,000	\$450,000
ANNUAL CARRYING CHARGES			
Interest	\$ 7,000	\$ 15,000	\$ 11,300
Amortization	2,900	6,100	4,600
Additional maintenance	<u>600</u>	<u>900</u>	<u>900</u>
TOTAL ANNUAL CHARGES	\$ 10,500	\$ 22,000	\$ 16,800

ESTIMATES OF BENEFITS

34. Local interests make similar claims for the effects of the proposed breakwater improvements at both harbors. Proponents anticipate that the breakwaters would improve the shelter in the harbors, and would increase the area protected. As a result of these effects local interests claim the following benefits:

a. Reduction of boat and shore facility damage in the harbors.

b. Improvement of docking and anchoring conditions, thereby permitting more regular commercial traffic and encouraging pleasure boat use of the harbors.

c. Provision of additional anchorage area, allowing expansion of the locally based lobster fleet and permitting use of the harbors as places of refuge.

35. Criehaven Harbor. - The extension of the Sunset Point Breakwater probably would not affect the degree of shelter, as the width of the harbor mouth at high tide and the exposure to storms would remain approximately the same. An alternative breakwater layout to constrict the harbor mouth would increase the degree of shelter in the harbor but would also increase the navigational hazard of entering or leaving the harbor. No definite data have been furnished as to the exact nature or annual amount of boat damage and shore property damage sustained. The lack of available data as to type and extent of damage indicates that, although undoubtedly existent, boat and property damage at Criehaven is not a major factor. Furthermore, no marked improvement in the degree of shelter due to the breakwater extension can be definitely foreseen. Therefore, no benefits have been evaluated for elimination of boat and property damage at Criehaven Harbor.

36. Under present conditions it is reported that commercial vessels carrying mail, freight, fuel and passengers are unable to dock at Criehaven Harbor during westerly or northwesterly storms. In some cases, scheduled trips are cancelled and in others, the trip is made and the boat has to return without discharging or taking on cargo or fares at the port. Besides the inconvenience, there is an economic loss due to the delay in the receipt and shipment of mail, supplies and freight, and the movement of passengers. However, the proposed breakwater extension at Criehaven Harbor would have no significant beneficial effect on navigation conditions at the harbor entrance, nor marked effect on the shelter afforded in the harbor, and therefore, no benefit has been estimated on this basis.

37. The proposed breakwater extension at Criehaven would increase the harbor area receiving the same degree of protection now afforded. This increased area would allow visiting vessels to remain overnight or for the duration of storms. This refuge would particularly result in savings to fishermen in adjacent waters, and would be of benefit to yachtsmen cruising in the area. Use of the harbor by pleasure craft, except as a temporary refuge, is doubtful in view of the limited facilities and attractions offered. Although a harbor of refuge is of general and real benefit to all navigation served a firm monetary evaluation of benefits is impracticable. In the best judgment of the

reporting officer, benefits from increased use of Criehaven Harbor as a place of refuge would approximate \$1,000 annually.

38. The increased harbor area would permit an expansion in the size of the locally based lobster fleet. The harbor area receiving protection equivalent to that now afforded would be increased about 25 percent. As the local fleet now consists of 20 boats, and as local proponents expect that the enlarged harbor will afford area for pleasure craft and for purposes of refuge not now provided, the expansion in the locally based fleet would be limited to less than five boats. At the time of the public hearing, a former lobster dealer contended that a fresh fish business could be developed on Criehaven Island; this dealer has subsequently moved from the Island, and there is no indication that such a business is now under consideration by others. The prospect of such a venture being realized is remote since the market as well as the fishing supply base is located at Rockland, Maine, one of the leading fishing ports of New England. Therefore, it is considered that the envisioned local fleet expansion would consist of lobster boats. It is probable that any fisherman establishing on Criehaven would be experienced and not deterred by the adverse aspects of basing on an isolated offshore island.

39. The population at Criehaven has remained stable since 1920. There are no definite assurances or plans of transferring to Criehaven provided the harbor is improved. The difficulties of establishing at Criehaven and certain intangible aspects to living on a small offshore island, may outweigh the economic advantages to be derived. In view of the uncertainties involved, and despite the economic advantages of the Criehaven Island base, any considerable transfer of fishermen to the Island cannot be relied upon.

40. A fisherman based on the mainland now travels an average of 16 nautical miles additional distance each way between his present home port and the fishing grounds. At eight knots, and an hourly operation cost of \$3.50 exclusive of any remuneration to the operator, the cost per round trip from the mainland ports averages \$14.00. The lobster fishing season in this area extends from April through June and from September through December, and the actual number of working days in that season have been found to average as follows:

	<u>Days</u>
April	15
May	22
June	6
September	22
October	19
November	18
December	12
Total	<u>114</u>

About two trips per month are made to the mainland during the fishing season, or a total of 14 trips, which would be on working days. Therefore, basing at the islands would save operation costs of 100 trips per season to and from the mainland, or \$1,400 a year. If 4 boats transferred to Criehaven, the total reduction in operation cost would be \$5,600. This saving represents a decrease in lobster production costs, and is a general benefit.

41. Matinicus Harbor. - Information obtained from local interests at Matinicus Harbor indicates average annual damages of \$2,000 to boats and equipment, and \$4,000 to buildings and wharves. It is considered that the desired breakwater will reduce these damages by about 50 percent. The reduction in damages to commercial boats and equipment is considered a general benefit estimated at \$1,000 annually. The reduction in damage to buildings and wharves is a local benefit estimated at about \$2,000 annually.

42. Under present conditions, it is reported that commercial vessels carrying mail, freight, fuel and passengers are unable to dock at Matinicus Harbor during southeasterly storms. As at Criehaven, in some cases scheduled trips are cancelled and in others, the trip is made and the boat has to return without discharging or taking on cargo or fares at the port. Besides the inconvenience, there is an economic loss due to the delay in the receipt and shipment of mail, supplies and freight, and the movement of passengers. However, although some improvement in docking conditions would result from the breakwater construction, navigation conditions at the harbor entrance would not be improved, and in fact would be worse to the extent that the harbor mouth would be narrower. The desired breakwater construction, therefore, would not materially affect the regularity of use of the harbor by cargo and passenger vessels. Although the reduction in wave action in the harbor would make it more suitable for pleasure craft, use of the harbor by such boats, except as a temporary refuge, is doubtful in view of the limited facilities and attractions offered.

43. The proposed breakwater at Wheatons Point would enlarge the protected harbor area, as well as improve the degree of protection in the area now used for anchorage. The increased area would allow visiting vessels to remain overnight or for the duration of storms. This refuge would particularly result in savings to fishermen in adjacent waters, and would be of benefit to yachtsmen cruising in the area. Although a harbor of refuge is of general and real benefit to all navigation served, a firm monetary evaluation is impracticable. In the best judgment of the reporting officer, the additional use of Matinicus Harbor as a place of refuge would produce benefits of \$2,000 annually.

44. The increased harbor area that would result from the breakwater construction is desired by local proponents to permit an expansion

in the size of the local lobster fleet. The annual economic benefit to a fisherman establishing at Matinicus would be similar to that for establishing at Criehaven, a saving in operating costs of \$14.00 per round trip to the mainland for an estimated 100 trips per year, or \$1,400. As at Criehaven, no definite indication is available that any fishermen would actually move to Matinicus if the harbor was improved. It is considered possible that 5 boats might be moved to Matinicus, if Criehaven Harbor is not also improved. The annual saving in operation of 5 boats transferred to Matinicus is about \$7,000. This amount is considered to be a benefit from construction of either the desired or alternate improvement.

45. The evaluated annual benefits from improvement of Criehaven and Matinicus Harbors by construction of the desired improvements are listed below:

	<u>CRIEHAVEN</u>	<u>MATINICUS</u>
ANNUAL BENEFITS		
Reduction in damage to boats and equipment	0	\$1,000
to buildings and wharves	0	2,000
Additional use as a harbor of refuge	\$1,000	2,000
Reduction of operation costs of lobster boats transferred to the additional safe anchorage area	<u>5,600</u>	<u>7,000</u>
TOTAL ANNUAL BENEFITS	\$6,600	\$12,000

46. The above benefits are considered to be general in nature except for benefits from reduction in damage to shore property, which are local in nature.

COMPARISON OF BENEFITS AND COSTS

47. The following table presents a comparison of the evaluated annual benefits and the estimated annual carrying charges for the desired 150-foot breakwater extension at Criehaven Harbor and for the 350-foot desired breakwater, and a 300-foot considered breakwater at Matinicus Harbor.

	<u>Annual Benefits</u>	<u>Annual Costs</u>	<u>Benefit-Cost Ratio</u>
Criehaven Harbor			
Desired 150-Ft. breakwater extension	\$ 6,600	\$10,500	0.6
Matinicus Harbor			
Desired 350-Ft. breakwater	12,000	22,000	0.5
Considered 300-ft. breakwater	12,000	16,800	0.7

48. It will be noted that none of the considered improvements are economically justified. Although there are certain intangible advantages that would accrue to the improvement of either Cribhaven or Matinicus Harbor it is not considered that they would be sufficient with the evaluated benefits, to justify construction of any of the considered improvements.

PROPOSED LOCAL COOPERATION

49. If the desired improvements were to be constructed there would be certain requirements of local cooperation. The benefits at Matinicus Harbor from reduction of damage to shore property are considered to be local benefits. Although no allocation of costs has been made, these benefits are about 17 percent of the total evaluated benefits, which would indicate a probable local cash contribution toward the construction cost of the desired breakwater of about \$80,000 or a cash contribution toward the construction cost of the considered 300-foot breakwater of about \$65,000. For any of the improvements local interests would also be required to provide without cost to the United States all necessary lands, easements, and rights-of-way for the construction and maintenance of the project when and as required, and hold and save the United States free from damages that may result from the construction and maintenance of the project.

COORDINATION WITH OTHER AGENCIES

50. All Federal, State, and local agencies having interests in the development and use of waterways were notified of the hearings held at Cribhaven September 30, 1947, and at Matinicus July 20, 1948, on the proposed improvements. All agencies that expressed interest in the harbors were in favor of the desired plans of improvement.

DISCUSSION

51. General. - Cribhaven Harbor is on the northwest side of Ragged Island, and Matinicus Harbor on the east side of Matinicus Island. These two small islands are part of a group of islands lying in the Atlantic Ocean about 17 miles south of the mouth of Penobscot Bay. The two harbors are only two miles apart, measured in a direct line, but are four miles apart by navigation courses. The islands lie in the path of coast-wise traffic to northern Maine and New Brunswick, and in one of the most productive lobster grounds on the Atlantic Coast. Both harbors are natural indentations of the rocky shores, partially protected by Federal breakwaters. The harbors have opposite exposures; Cribhaven Harbor offering protection from all storms except those from the west and northwest, and Matinicus Harbor from all storms except those from the east and southeast. Both Harbors serve as base ports for lobster fishing, the

sole industry of the inhabitants of the islands. The lobster catch is shipped by rail, truck, and air over the entire country, and forms a part of the national food supply.

52. Criehaven Harbor. - Criehaven Harbor is about 9 acres in total area. The protected harbor area is limited to about 3 acres by the extent of the breakwater projecting northerly 300 feet from Sunset Point on the west side of the harbor. This breakwater does not extend as far north as Harbor Point on the east shore of the harbor mouth. Criehaven Harbor is subject to considerable surge and undertow from southerly and westerly seas sweeping around the end of Sunset Point Breakwater and being deflected from Harbor Point. The harbor is slightly protected by the lee afforded by Matinicus Island. The local lobster fleet is limited to 20 vessels by the size of the presently protected harbor area. Use of the harbor as a refuge during storms, or as an overnight anchorage for outside fishing boats or transient pleasure craft, is handicapped by the present anchorage limitations. Commerce at the harbor, consisting of lobster shipping, mail, passengers, fuel and supplies is often impeded or delayed. The summer population of Ragged Island is about 50 people. Local interests estimated the real estate value to be \$161,000 in 1947.

53. Criehaven interests desire a 150-foot extension to the existing Federal breakwater to alleviate storm damage in the harbor and to enlarge the protected anchorage area, thus enabling an increase in the size of the local lobster fleet and affording a refuge for fishing and pleasure craft in the area. Extension of the breakwater would increase the sheltered anchorage area by about 25 percent. Some improvement in harbor protection might also be afforded by reduction of direct wave action and surge. It is not considered that the breakwater extension would reduce damages to vessels in the harbor or reduce delays to the supply boats.

54. The doubling in size of the local fleet as a result of the improvement, anticipated by local interests, is considered to be optimistic. However, the economies in operation costs afforded by the advantageous location of the harbor would permit lobstermen to transfer their base from the mainland to Criehaven. The annual benefits to be realized by the transfer of 4 lobster boats have been estimated at \$5600 annually. There is no direct evidence that these transfers would in fact occur. Benefits that are anticipated by provision of protected area to serve as a refuge for fishing and pleasure boats have been estimated as \$1,000 annually. The benefits are considered to be general in nature. The estimated annual costs of \$10,500 and evaluated benefits of \$6,600 indicate a benefit-cost ratio of 0.6 to 1.

55. Matinicus Harbor. - Matinicus Harbor is a natural small boat harbor that serves about 180 people on Matinicus Island. The real estate valuation of the town, which includes 5 other very small islands was \$57,000 in 1950. The harbor is well protected from storms on all

sides, except those originating in the east and southeast. A partial protection on the easterly side is afforded by the existing Federal project breakwater, extending southeasterly 450 feet from the main island at Youngs Point to Indian Ledge, a small island near the main channel entrance. This breakwater shelters an anchorage of about 2 acres with depths of 6 to 7 feet, and about 3 acres with depths of 4 to 6 feet at mean low water. The remainder of the harbor is exposed, and includes an area of approximately 5 acres with depths of 20 to 25 feet at mean low water.

56. The desired plan of improvement consists of the construction of a stone breakwater, extending 350 feet northerly from the north side of Wheaton Island, having a top width of 10 feet, and side slopes of 1 on 1.5. Comparative studies of various lengths and locations for the desired improvement indicated that the location proposed by local interests is the most suitable. However, it was determined that a length of 300 feet, in lieu of the 350-foot length desired by local interests, offered practically the same amount of protection with a substantial decrease in the first cost of the improvement.

57. The construction of either breakwater would provide additional shelter to the anchorage and landing areas in times of easterly and southeasterly storms. It would probably not improve the maintenance of regular schedules by commercial supply boats which carry all commodities to the island, and which cannot enter the harbor during storms. Some additional protection will be provided for the anchorage in the lee of the existing breakwater, allowing greater use of the anchorage, particularly along the southerly and southwesterly sides. About 4 acres would be sheltered by the lee of the desired breakwater at the southerly end of the harbor where there are depths of 10 to 25 feet at mean low water. The enlarged sheltered anchorage area would allow some expansion of the lobster boat fleet, and provide a place of refuge. It is estimated that the local lobster boat fleet might be increased by five vessels transferred from bases on the mainland.

58. The evaluated benefits include savings in costs by transfer of five lobster boats from other less economical bases, benefits to the existing fleet and shore installations in the harbor through reduction of the average annual damage incurred in storms, and benefits to transient and pleasure boats by the provision of a readily accessible harbor of refuge. The evaluated benefits total \$12,000 for either the 350- or the 300-foot breakwater. The benefit-cost ratio for the desired 350-foot breakwater is 0.5 to 1, and for the considered 300-foot breakwater is 0.7 to 1.

59. The evaluated benefits are not sufficient to justify the improvement of Matinicus Harbor. However, if an improvement was justified, local interests would be required to make a cash contribution and furnish all land and easements necessary for the prosecution and future maintenance of the improvement.

CONCLUSIONS

60. Further development of the harbors at Criehaven and Matinicus would increase the protected anchorage areas, reduce damages to existing craft, provide places of refuge for fishing and pleasure craft, and permit the expansion and improvement of the fishing industry. However, the costs for the necessary construction of breakwaters to assure these benefits outweigh the evaluated benefits. The modification of the existing projects at Criehaven or Matinicus is not economically justified at this time.

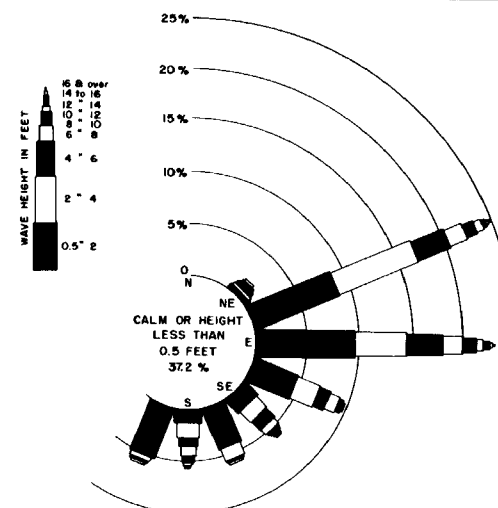
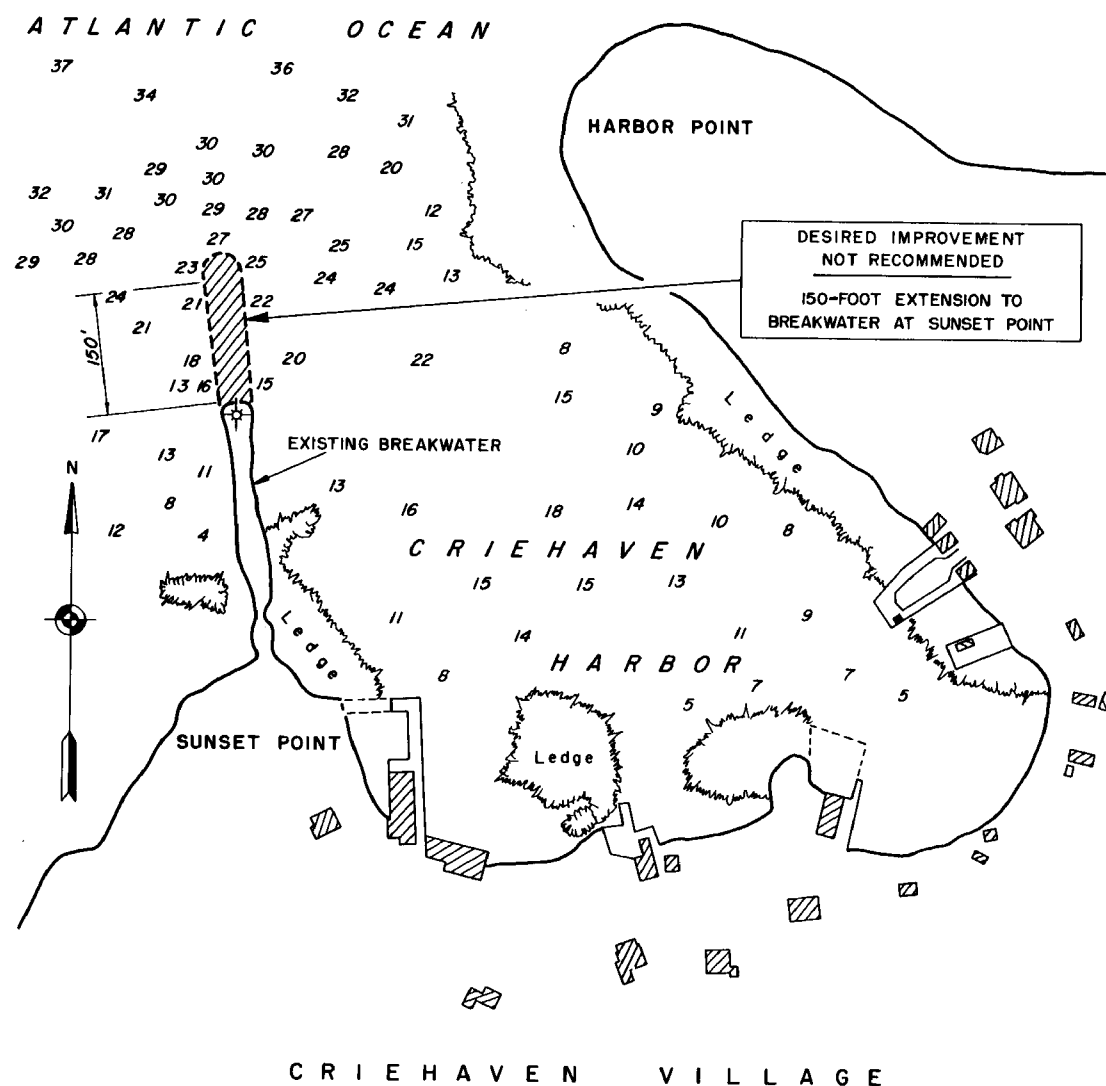
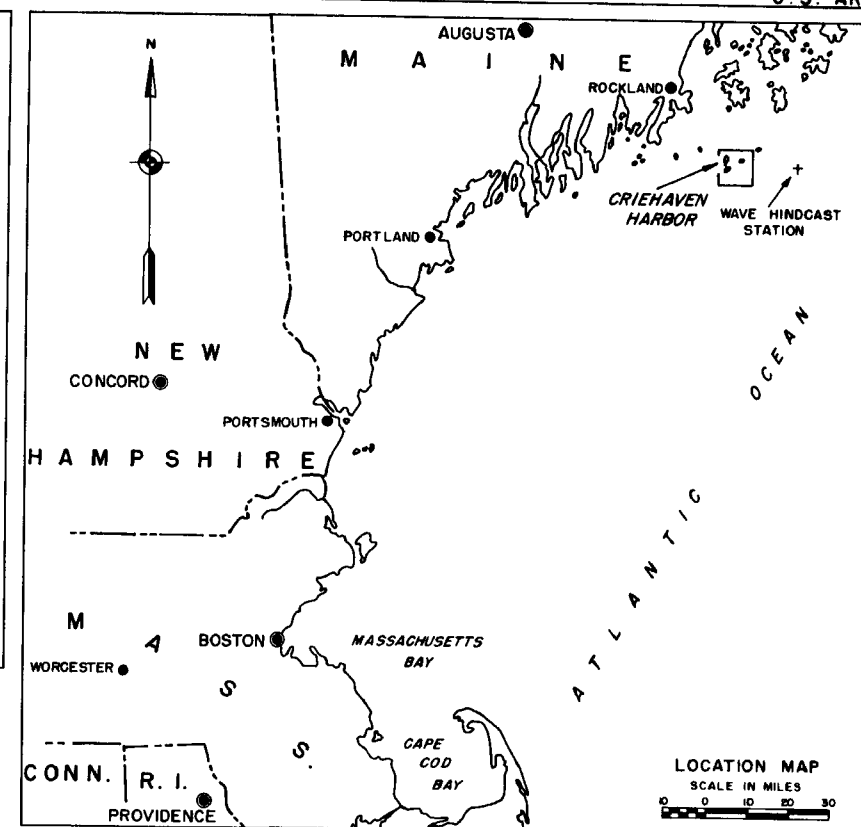
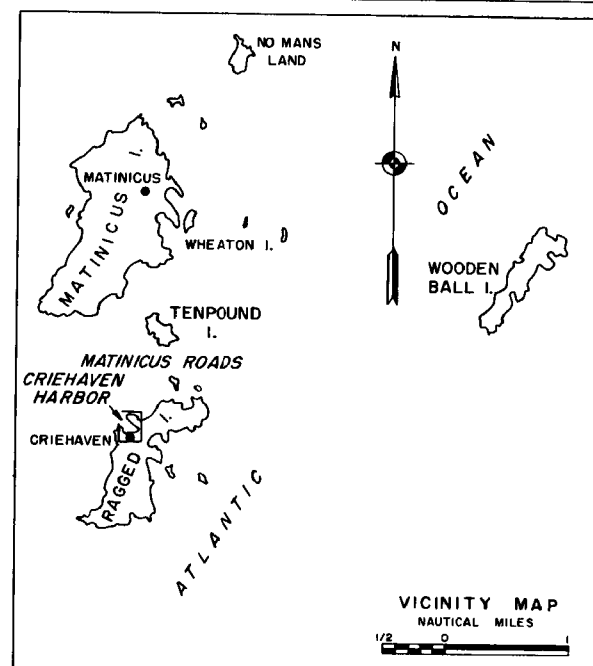
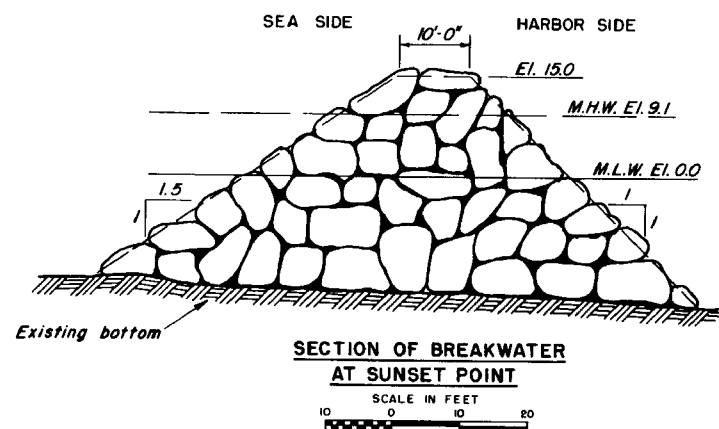
RECOMMENDATIONS

61. The Division Engineer recommends that no modification be made at this time in the existing projects for Criehaven Harbor and Matinicus Harbor.

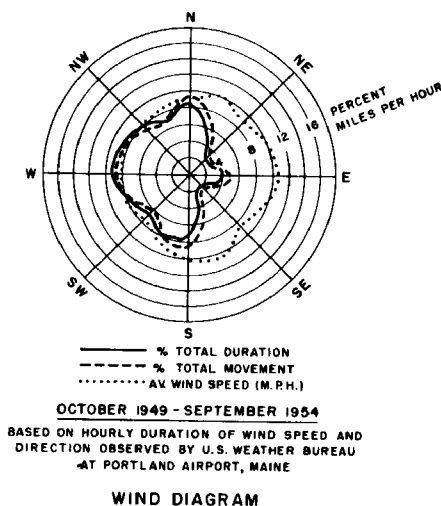
ROBERT J. FLEMING, JR.
Brigadier General, U. S. Army
Division Engineer

2 Incls:

- 1 - Plate No. 1 - Criehaven Harbor
- 2 - Plate No. 2 - Matinicus Harbor



COMPOSED OF DATA OBTAINED BY HINDCAST OF 3 YEARS OF WIND RECORDS (1948-1950). FROM BEACH EROSION TECHNICAL MEMORANDUM NO. 55.



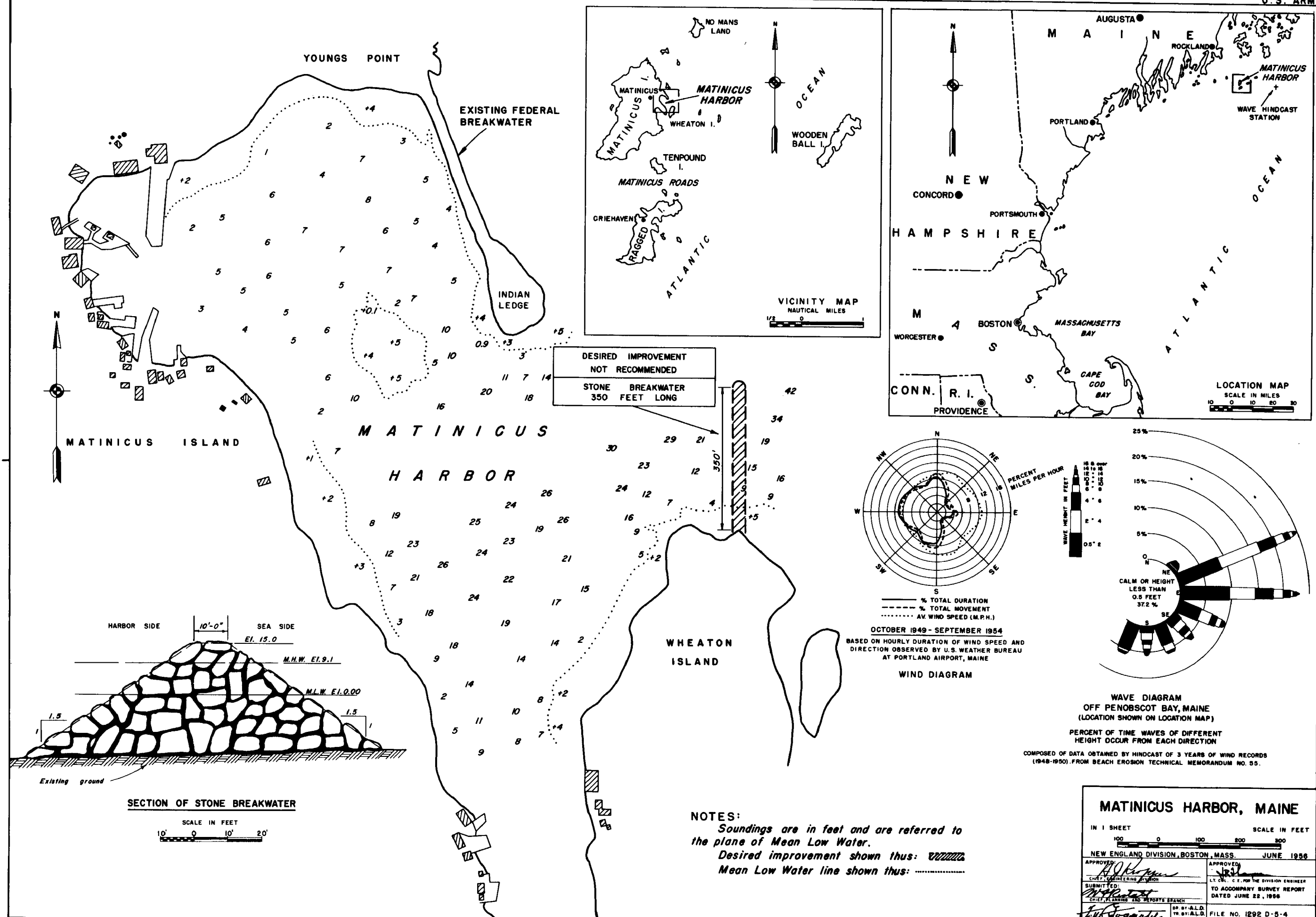
NOTES:

Soundings are in feet and are referred to the plane of Mean Low Water.

Desired improvement shown thus: ZZZZ

CRIEHAVER HARBOR, MAINE

IN 1 SHEET		SCALE IN FEET	
100 0 100 200 300			
NEW ENGLAND DIVISION, BOSTON, MASS. JUNE 1956			
APPROVED:	APPROVED:		
CHIEF ENGINEERING DIVISION	LT. COL. C. E. FOR THE DIVISION ENGINEER		
SUBMITTED:	TO ACCOMPANY SURVEY REPORT		
CHIEF PLANNING AND REPORTS BRANCH	DATED JUNE 22, 1956		
DR BY: A.L.D.	TR BY: A.L.D.	CH BY: A.L.D.	FILE NO. 1291 D-5-3



NOTES:

Soundings are in feet and are referred to the plane of Mean Low Water.

Desired improvement shown thus:

Mean Low Water line shown thus:

MATINICUS HARBOR, MAINE

IN 1 SHEET

SCALE IN FEET
100 0 100 200 300

NEW ENGLAND DIVISION, BOSTON, MASS. JUNE 1956

APPROVED: LT. COL. C. E. FOR THE DIVISION ENGINEER

SUBMITTED: TO ACCOMPANY SURVEY REPORT DATED JUNE 22, 1956

CHIEF, PLANNING AND REPORTS BRANCH

CHIEF, RIVER AND HARBOR DIST.

DR. ST. A.L.D. TR. ST. A.L.D. CH. ST. A.L.D.

FILE NO. 1292 D-5-4